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**Exploring conical intersections through high resolution photofragment translational spectroscopy<sup>1</sup>**

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High resolution measurements of the kinetic energies of H atom fragments formed during UV photolysis of gas phase imidazole, [1,2] pyrrole, [3] phenol [4] and thiophenol molecules show that: (i) X-H (X = N, O, S) bond fission is an important non-radiative decay process from the  $^1\pi\sigma^*$  excited states in each of these molecules, and (ii) that the respective co-fragments (imidazolyl, pyrrolyl, phenoxy and thiophenoxy) are formed in very limited sub-sets of their available vibrational states. Identification of these product states yields uniquely detailed insights into the vibronic couplings involved in the photo-induced evolution from parent molecule to ultimate fragments.

[1] M.N.R. Ashfold, B. Cronin, A.L. Devine, R.N. Dixon and M.G.D. Nix, *Science* (2006), **312**, 1637.

[2] A.L. Devine, B. Cronin, M.G.D. Nix and M.N.R. Ashfold, *J. Chem. Phys.* (in press).

[3] B. Cronin, M.G.D. Nix, R.H. Qadiri and M.N.R. Ashfold, *Phys. Chem. Chem. Phys.* (2004), 6, 5031.

[4] M.G.D. Nix, A.L. Devine, B. Cronin, R.N. Dixon and M.N.R. Ashfold, *J. Chem. Phys.* (2006), **125**, 133318.

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